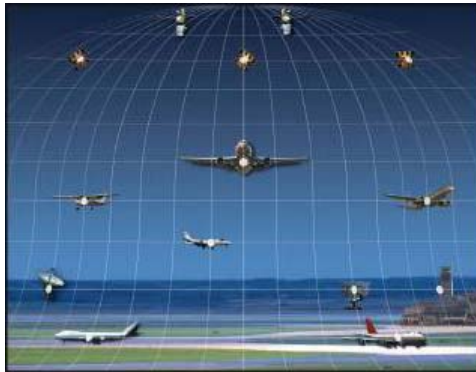


Aeronautical Communication, Navigation and Surveillance at NASA Glenn Research Center



What is “CNS”?

Communication: radio, satellite, and wireline connections for voice and data exchange between aircraft, ground controllers (air traffic control?) and airport and airline facilities.

Navigation: determining the present location of an aircraft and the required course to arrive at a destination.

Surveillance: monitoring of the location and course of an aircraft for air traffic management, safety and security.

Why is this important to Ohio and the rest of the US?

“Today's aviation system cannot meet 21st century needs. That was the conclusion of numerous studies and blue ribbon panels, including most recently, the National Research Council and the Commission on the Future of the United States Aerospace Industry. The current aviation system cannot tackle emerging safety and homeland security issues. It cannot adequately address more efficient and enlarged capacity and changing market conditions. It cannot restore let alone enhance America's international leadership in aviation and aerospace. Given these challenges, piecemeal solutions or tinkering at the margins will not work. The future demands nothing less than the complete transformation of the U.S. air system.”--

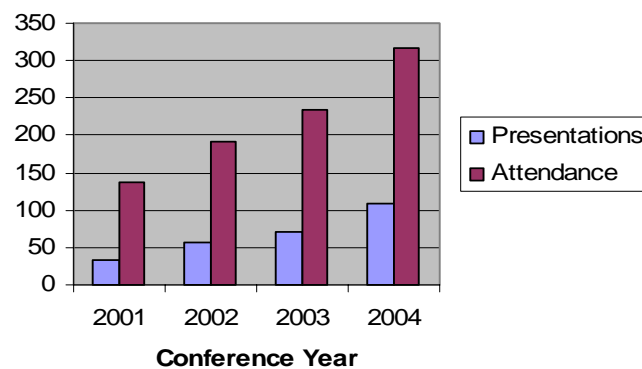
http://www.jpdo.aero/site_content/factsheet.html

- US aviation infrastructure is currently at capacity and is in need of modernization. This affects capacity, safety and security of the US airspace.
- Several government agencies (FAA, NASA, DHS, DoC, DoD) are involved in this program through the Joint Planning and Development Office (JPDO).
- The U.S. is losing its dominance in civil aviation and aeronautics due to a lack of government support and investment.
- JPDO and the FAA rely on NASA for critical research and development in civil aviation.

GRC History in CNS

- Since 1970 NASA Glenn Research Center (GRC) has been a leader in advanced communications satellite programs
- NASA GRC has been a major participant in Communications, Navigation and Surveillance (CNS) research and development under several NASA aeronautics programs and projects from 1997 to present
- NASA GRC has become a recognized leader in Integrated Communications, Navigation and Surveillance (ICNS)
- NASA GRC initiated and sponsors the annual ICNS Conference and Workshop, bringing together key industry executives and technologists from the US and around the world.

ICNS Conference Growth



GRC CNS Research Staff and Facilities

- Nearly 100 highly experienced dedicated research and development staff
- Critical Modeling, Simulation and Emulation laboratories
- Unique Ground Mobile experiment facility
- Flight Demonstration facilities – Navy S3-B Viking, Twin Otter and 2 Lear Jets
- 4 Antenna test facilities/ranges

These facilities need to remain in Ohio in order to continue Ohio's tradition in aviation.



GRC Impact and Accomplishments

Past Programs

- Aero-X: First Ka band satellite communications to an aircraft in flight; demonstrated several key technologies for advanced aeronautical communication.
- AeroSAPIENT: First networked broadband communication to and from a transport aircraft; catalyst for ConnexionSM by Boeing in-flight satcom service.

Current Programs

Airspace Systems Program

- ACAST: provide technologies to enable increases in capacity, efficiency, mobility and flexibility for users of the NAS.
- FAA/EuroControl Activities: cooperative research effort with FAA and EuroControl; NASA provides research capacity to FAA.
- SATS: developed and demonstrated “airborne internet” concept in general aviation.
- VAMS: developing simulation models for new aviation technologies and advanced concepts.

Aviation Safety and Security Program

- S-DARS: Low-cost satellite distribution of aviation weather information to remote areas; demonstrated over Asia and Africa.
- Aviation Security Demonstrations: December 6, 2001 and January 10, 2002 partnered with industry on comprehensive evaluation of near-term, FAA-certifiable technologies operating at a full-range of flight altitudes, and serving key aviation segments. Principal benefits of the proposed technologies include real-time anomaly detection and situational awareness of the cockpit and cabin by ground personnel.

Vehicle Systems Program

- Access5: industry alliance for management requirements and demonstrations of Remotely Operated Aircraft in civilian airspace.

Other Major Contributions

- Major Technical Contributions to national and international standards and regulatory bodies:
 - *RTCA, AEEC, ICAO*--impacting air traffic management, aviation safety and security
 - *ITU*--international radio spectrum allocation
 - *IETF*--Internet standards and practices

- National Center for CNS R&D (NCCR)
 - The NCCR will serve as a national driver to *leverage and integrate* the *resources, knowledge and capabilities of industry, government and academia* to address critical elements needed to create the digital airspace infrastructure of the future.
 - The NCCR will create a center of gravity drawing and stimulating new aeronautical business activity in Ohio.

GRC Awards for Aerospace Communications

- 18 R&D 100 Awards
- Several NASA TGIR (Turning Goals in Reality) Awards
- National Research Council 2003 Review Recognition for Project Management

GRC Summary Comments

- The current Aeronautical Communications Projects integrate the long heritage of GRC expertise into a peer reviewed, and highly relevant project which enjoys widespread FAA and industry support.
- The project employs GRC as a research organization for the FAA. The FAA is focused on near term operations and relies on NASA to conduct research into longer-term transformational technologies.
- International decisions are being currently made on aviation frequency spectrum allocation, the congestion of the VHF (ATM, pilot-to-tower, etc.) communication channels, and aircraft separation standards.
- The Aeronautical Communications program is integral to the future of GRC and accounts for approximately 12% of the projected GRC FY06 budget.

NASA Glenn is working to assure U.S. primacy in aviation and enabling growth in the industry. It is important to the economy of the State of Ohio to support the continuation of this work here at NASA Glenn.

Acronyms

ACAST – Advanced CNS Architectures and System Technologies
Access5 – Project to introduce Remotely Operated Aircraft into civilian airspace
AEEC – Airlines Electronic Engineering Committee
AeroSAPIENT – Aeronautical Satellite Assisted Process for Information Exchange through Network Technologies
ATM – Air Traffic Management
CNS – Communications, Navigation and Surveillance
DHS – Department of Homeland Security
DoC – Department of Commerce
DoD – Department of Defense
FAA – Federal Aviation Administration
GRC – Glenn Research Center
ICAO – International Civil Aviation Organization
ICNS – Integrated Communications, Navigation and Surveillance
IETF – Internet Engineering Task Force
ITU – International Telecommunications Union
JPDO – Joint Planning and Development Office
NASA – National Aeronautics and Space Administration
NCCR – National Center for CNS R&D
R&D – Research and Development
RTCA – Radio Technical Commission for Aeronautics
SATS – Small Aircraft Transportation System
S-DARS – Satellite Digital Audio Radio Services
VAMS – Virtual Airspace Modeling and Simulation
VHF – Very High Frequency